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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,086	06/30/2003	William Earl Russell II	24GA5998-7	8107

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EXAMINER

PALABRICA, RICARDO J

ART UNIT	PAPER NUMBER
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3663

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/608,086	Applicant(s) RUSSELL ET AL.	
	Examiner Rick Palabrica	Art Unit 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/26/06 and 13/07/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 31-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In view of the Reply Brief filed on 12/26/06, PROSECUTION IS HEREBY REOPENED. A new ground for rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:


JACK KEITH
SUPERVISORY PATENT EXAMINER

Response to Arguments

2. In his Reply Brief, appellant misinterprets the direction of the Board on its May 25, 2006 Remand of the application to the examiner and the examiner's response to said Remand.

The Board did not completely disagree with the examiner's rejection of the claims; otherwise they would have REVERSED outright the examiner without issuing a

Remand. The Remand indicates that there are merits to the examiner's action but additional work needs to be done to provide a firmer basis for the rejections. The Board's directive to the examiner is essentially to further search for prior art that teaches the optimization process. The Board did not exclude applied art Musick, per se. In fact, the Board even highlighted a key aspect of Musick's method by underlining the phrase "maximization of plant capacity and availability" (see page 4, line 6). Such highlighting is indicative that Musick has a teaching relevant to the claimed invention but needs to be further complemented by another reference, to show that optimization is achieved when plant capacity and availability is maximized within acceptable fuel design limits.

Note that the claims, e.g., claim 1, recites:

"performing an optimization process on one of a computer and computer network based on the received state-point data to generate one or more optimized independent control variable values." Underlining provided.

Clearly, the claims do not require performing optimization for all independent control variables. Rather, optimizing at least one independent control variable meets the claim limitation. (Examiner's note: Appellant cites "core flow" (rate of water flow through the core), as one of the independent control variables (see page 2 of the specification). Musick also uses core flow rate as one of the parameters (a.k.a. independent control variable) in maximization of plant capacity and availability (see col. 13, lines 22+ or col. 15, lines 35+). Thus, there is at least one independent control variable that matches Musick and appellant's case).

Applying the above criterion to Musick, if one can show that at least one independent control variable is optimized, either as part of or as a result of his maximization of plant capacity and availability, then the claim limitation is met. Such is the case with Musick when combined with the teaching in a complementary prior art, Nuclear Plant Journal, as discussed in the August 15, 2006 Examiner's answer.

Since the appellant appears to continue to misunderstand the rationale for the rejection and misconstrues the intent of the Remand, the examiner now provides additional references that, in combination with Musick, further demonstrate that the claims are not patentable, as presently set forth.

3. In his Reply Brief, appellant states:

"Musick, contrary to the Examiner's assumption, is not directed towards maximizing plant capacity and availability. Instead, Musick is directed towards the latter part of the above quotation, which is to say that Musick is concerned with detecting violation of acceptable fuel design limits." Underlining provided. See page 7 of Reply Brief.

The appellant is incorrect, as evidenced by the following statement in Musick:

"Demands for greater reactor availability and increased emphasis placed on safety requirements designed to protect the reactor's core and the integrity of fuel rod cladding cogently point out the need for a flexible and rapid system which not only prevents the core from exceeding its safety limits but also allows operation of the reactor close to those limits to maximize reactor efficiency and availability.

Such a protection system must consist of two components: One system for sensing reactor conditions and tripping the reactor when a safety violation is imminent, and a second system for calculating the appropriate operating limits which would ensure that the protection system has sufficient time to safety trip the reactor while at the same time allowing maximum use of the reactor.

In the following discussion, the first system will be called the 'core protection calculator' and the second system will be called the 'Core Operating Limit Supervisory System' (COLSS)". Underlining provided. See col. 5, lines 32+.

4. Still in his Reply Brief, appellant admits he does not understand the teaching in the Nuclear Plant Journal that is applied in combination with Musick. (see page 8 of the Reply Brief). The examiner will now further simplify the rationale that has been succinctly described in the 8/15/06 Examiner's Answer.

In its Remand, wherein the Board highlighted Musick's method in achieving "maximization of plant capacity and availability within acceptable fuel design limits," the Board was looking for a statement or teaching or basis that demonstrates that such plant capacity and availability maximization is accompanied by or results in optimization of at least one independent control variable. Such was not clearly evident to the Board because the specific term, "optimization", is not explicitly stated by Musick in regard to their maximization. Nonetheless such optimization is implied by Musick in his teaching of some failings of prior art, which are overcome by his method, as evidenced by the following statement:

"This second more sophisticated prior art scheme increased the plant availability and capability but, nonetheless could not approach the optimum operating conditions since the calculations were limited by the degree of refinement which was allowed by the analogue circuitry." See col. 5, lines 1+.

This statement is a clear teaching that Musick's method aims to achieve optimization along with maximization of plant availability and capacity. Musick then teaches how such prior art failings are overcome by his method, by referring

to his “core protection calculator” and “Core Operating Limit Supervisory System (COLSS)”, discussed in section 3 above.

Notwithstanding Musick’s implied nexus between optimization and maximization of plant capacity and availability, and in response to the Remand for further prior art search, the examiner has cited the Nuclear Plant Journal. This reference shows that in the nuclear art, when one maximizes plant capacity and availability, one inherently optimizes at least one independent control variable of the reactor. Such optimization cannot be prevented because one cannot maximize plant capacity and availability without optimizing at least one independent control variable of the system.

As stated above, additional references are cited below to demonstrate this inherency of optimization with plant capacity and availability maximization.

5. Still in his Reply Brief, appellant argues that the Nuclear Plant Journal, “fails to teach or suggest ‘[a] method of determining independent control variable values for a nuclear reactor under operation, comprising: ... performing an optimization process on one of a computer and computer network based on the received state-point data to generate one or more independent control variable values,’ as recited in claim31.” The examiner disagrees.

The appellant misconstrues the teaching from the Nuclear Plant Journal that the examiner uses to combine with Musick. The teaching is not on determining independent control variable values, but on the nexus between

optimization and maximization of plant capacity and availability, as discussed in section 4 above.

Appellant's argument is based on his artificially created "straw man" that bears no relation at all to the teaching in the Journal that the examiner applied to combine with Musick. He then attacks his own straw man, which he improperly attributes to the examiner, in an attempt to overcome the rejections.

In conclusion, appellant's argument does not show that the references do not teach what the examiner has stated they teach, nor has the appellant shown that the examiner's reasoning for and manner of combining the teachings of the references is improper or invalid.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 31-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Musick (U.S. 4,080,251) in view of any one of "Winning Strategies for Maintenance Optimization at U.S. NPPs" (Nuclear Plant Journal Editorial Archive), hereinafter referred to as "Nuclear Plant Journal - 1999", Knollenberg, "The Energy Supply for the United States & the Role of Nuclear Energy", "The Economics of Nuclear Energy" (Nuclear Plant Journal Editorial Archive), hereinafter referred to as "Nuclear Plant Journal - 1998).

Musick teaches a control method that achieves maximization of plant capacity and availability within acceptable fuel design limits under normal operation and anticipated operational occurrences (see col. 8, lines 23).

Musick's computerized method of controlling a nuclear reactor achieves maximization of plant capacity and availability within acceptable fuel design limits, under normal operation and anticipated operational occurrences.

As stated in the 11/08/05 Examiner's Answer, appellant's failure to define the term "optimization" required the examiner to apply its ordinary meaning, i.e.,

"[A]n act, process or methodology of making something (as a design, system, decision) as fully perfect, functional, or effective as possible" (Merriam Webster's Collegiate Dictionary, 10th edition, 1993).

The above definition of "optimization" does not call for an ABSOLUTE perfection of a process. Rather, it allows for perfection, within reasonable limits, as evidenced by the qualified language, "as fully perfect, functional or effective **as possible**."

Such optimization by reasonable perfection is common in nuclear power plants because of the inherent interdependence of system parameters. Musick himself recognizes this fact by his statement:

"Heretofore, the prior art has attempted core protection through means and methods that have sacrificed plant capacity and availability. Various schemes with different degrees of sophistication were implemented, none of which enable the utilization of the plant's full potential. The least sophisticated system consisted of the establishment of a series of independent limits for each of the parameters upon which the design limit in question depended. By doing so, this prior art method could not account for functional interdependence of all of the variables. Thus, the situation could arise in which one parameter deviated from its optimum value, without causing an approach to the design limit since the other parameters on which the design limit depended might have compensated for the one bad parametric value." See col. 4, lines 37+. Underlining provided.

Clearly, Musick's maximization of plant capacity and availability within design limits optimizes ONLY selected parameters (which includes independent control variables) and NOT all parameters, because changing one parameter inherently causes change in some other parameters. Note the claims only require at least one independent control variable (not all such variables) to be optimized. Thus, Musick's optimization of selected parameters already far exceeds meeting the claim limitation.

In any case, Nuclear Plant Journal - 1999 teaches several maintenance optimization strategies that have a common goal of increasing reliability and plant availability while reducing costs (see Abstract). It further teaches that optimizing maintenance processes, procedures and schedules reduces refueling outage duration, which inherently extend the interval between outages, and increases plant availability or capacity factors (see page 3, lines 11+). Maintenance processes also ensure that plant systems operate reliably and within design limits. The secondary reference clearly demonstrates the clear nexus between optimization and maximum plant availability.

In his paper, "The Energy Supply for the United States & the Role of Nuclear Energy", delivered at the University of Michigan, Knollenberg remarked:

"Shorter refueling and maintenance outages and plant optimization have brought U.S. nuclear power plant capacity factors to their all-time high of 89%. Underlining provided. See page 2 of the Paper.

Knollenberg's, "all-time high capacity factor" is synonymous to "maximum capacity factor" in Musick.

In his article, "The Economics of Nuclear Energy," Nuclear Plant Journal, 1998, Pryor remarked:

"A number of U.S. nuclear plants are recording capacity factors in excess of 90 percent.... These improved capacity factors have been driven primarily by reductions in outage durations. ... Although the top ten plants are achieving excellent forced outages approaching 0.1 percent, the industry, in general, is well off the pace at slightly greater than 0.3 percent. The industry needs to continue to focus on this area of improvement to achieve 0.1 percent forced outage rates. This can be done with greater outage and maintenance optimization. Underlining provided. See page 2.

Any one of these references clearly show that one cannot achieve maximum plant capacity without performing optimization, and such optimization inherently involves optimizing at least one independent control variable of the reactor system.

The examiner has previously shown that Musick's computerized control process generates one or more independent control variables from received state-point data (see Examiner's answer, page 5, or section 2 above). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to have considered Musick's control process as an optimization that maximizes plant capacity and availability within acceptable fuel design, based on the teaching of any one of Nuclear Plant Journal-1999, Knollenberg, or Nuclear Plant Journal-1998. Such maximization inherently includes optimization of at least one independent control variable of the reactor.

7. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Musick with any one Nuclear Plant Journal-1999, or Knollenberg, or Nuclear Plant Journal-1998, as applied to claims 31-39 above, and further in view of Takeuchi et al.

The combination of Musick with any one of Nuclear Plant Journal-1999, or Knollenberg, or Nuclear Plant Journal-1998, teaches using actual plant data to relate independent variables (e.g., DNBR or core flow) to the dependent variables (e.g., core power). See, for example, equation 1 at col. 3 of Musick.

Takeuchi et al. teach the use of simulated plant data for evaluating plant conditions (see Abstract).

One having ordinary skill in the art would have recognized that it is old and advantageous to use a simulator as a substitute for an actual reactor in conducting operational/safety analysis of plant conditions, because a simulator is inherently safer and more economical to use for this purpose.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method, as disclosed by the combination of Musick with any one of Nuclear Plant Journal-1999, or Knollenberg, or Nuclear Plant Journal-1998, by the teaching of Takeuchi et al., to use simulated data instead of actual plant data, to gain the advantages thereof (i.e., safety and economy), because such modification is no more than the use of well-known expedients within the art, and the substitution of one source of plant data for analysis by another well-known source.

8. The 11/10/04 Final Office action is withdrawn and replaced by this Office action.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:00-4:30, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3663

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RJP
February 8, 2007


RICARDO J. PALABRICA
PRIMARY EXAMINER